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REMARKS

Claims 1-14 and 16-20 are currently pending in the patent application. The Examiner has rejected Claims 2, 4, 6, 8-11, and 13 under 35 USC 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention; Claims 1-5 under 35 USC 103 as unpatentable over the teachings of Zolnowsky; and, Claims 6-14, and 16-20 under 35 USC 103 as being unpatentable over the teachings of Zolnowsky in view of Cameron. For the reasons set forth below, Applicants respectfully assert that all of the pending claims, as amended, are definite and patentable over the cited prior art.

With regard to the rejections of Claims 2, 4, 6, 8-11, and 13 under 35 USC 112, Applicants have amended the language of each of those claims to address the antecedent basis concerns. With regard to the rejections based upon the Zolnowsky patent, Applicants respectfully assert that the Zolnowsky patent neither teaches nor suggests the invention as claimed.

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The present invention provides a scheduling system and method for a multinode UNIX-based environment. Under the invention, at least one local scheduler prioritizes processes in accordance with a global prioritized schedule which is generated at the global scheduler. The local scheduler maintains a local priority list of ready-to-execute tasks correlated with local processes, which list is updated in accordance with the global prioritized schedule provided from the global scheduler. As set forth in the independent claims, the present invention provides a method and system for performing the steps in a UNIX-based environment of scheduling a plurality of tasks of more than one application among processes on at least one computing node, in a system having a global scheduler and at least one computing node having a local scheduler and a plurality of local processes comprising the steps of: dynamically creating a global prioritized schedule of a plurality of tasks, said schedule including tasks of the more than one application; communicating the global prioritized schedule to the computing nodes; determining correspondence between the plurality of tasks and the plurality of local processes; and dynamically prioritizing

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local processes in a local priority list in accordance with the global prioritized schedule to allow simultaneous execution of tasks from the more than one application. The present approach of global (including inter-node) and local scheduling minimizes unused CPU time which would otherwise occur when an individual task is temporarily blocked or suspended waiting for I/O.

The Examiner first cites the Zolnowsky patent as the sole reference against Claims 1-5. The Zolnowsky patent provides a dispatcher model which maintains a global dispatch queue for non-bound higher priority real time threads. Each processor in the multiprocessor environment selects a candidate thread from its own queue, compares the selected thread with threads in the global real-time queue, chooses the higher priority thread for execution, and then performs a synchronization algorithm to verify that no other processor has already elected to execute the thread from the global real time queue. The Zolnowsky patent does not provide any teachings with regard to a global scheduler creating a global prioritized scheduler and communicating that schedule to local computing nodes at which a local scheduler updates a local prioritized schedule.

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Under the Zolnowsky patent, there is one scheduler for each one processor, each of which has an associated dispatch queue. In the Zolnowsky system, a processor can select a thread from the global queue or its own queue. When a processor selects a thread, it performs a synchronization algorithm to ensure that another processor has not also selected that thread. The Zolnowsky system has a "high priority real time queue" on which any of the processors can place a thread (see: column 7, lines 43-48). The high priority real time queue is not a global scheduler means which dynamically creates a global prioritized schedule that is then used by local schedulers. In addition, the Zolnowsky patent does not provide at least one local scheduler associated with each the more than one computing nodes, nor does it teach that computing nodes each have a plurality of processes. In Zolnowsky, there is one scheduler per processor. Furthermore, the schedulers (i.e., the one scheduler per processor) do not adhere to a prioritized schedule obtained from a global scheduler, but rather "...determine when and which threads are to be dispatched for execution on the system processors" (see: column 7, lines 15-20) in accordance with a protocol which

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is schematically illustrated in Zolnowsky's Figure 8. Clearly the Zolnowsky patent does not provide any teaching or suggestion of the claimed system or method wherein both global and local schedulers are available and wherein a global prioritized schedule is created, updated, and communicated to the local schedulers for updating a local prioritized list. Accordingly, Applicants believe that Claims 1-5 are not rendered obvious by the Zolnowsky patent.

The Examiner has rejected the remaining claims based on a combination of teachings from Zolnowsky and Cameron. Applicants rely on the analysis of the Zolnowsky patent set forth above and maintain that Zolnowsky does not teach or suggest the claimed invention. The Cameron patent is directed to scheduling tasks across multiple nodes (with node defined at Column 2, line 40 as a single processor location) wherein, as specifically stated in Column 2, lines 53-58 and again at Column 7, lines 37-42, "...only one application program is active at a time on any one node and an entire application program is active at once across all of the nodes on which the application program is loaded." In the Cameron system, all actions are initiated from a central dispatcher. While multiple applications can be

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assigned to a single processor, only one can be active and ready to run at a time. (Applicants direct the Examiner's attention to the statement in Col. 4, line 5 et seq of Cameron that "although more than one application is assigned in a partition, an entire application is scheduled at once across all the nodes on which it is loaded"). Those applications are assigned by the central dispatcher for the partition. The Cameron global scheduler issues a single directive to execute a task at a particular time and has no capability to prioritize tasks or to dynamically assign tasks of multiple processes in order of importance to utilize idle CPU time. The Cameron patent provides parallel tasks but single level global scheduling with no means for deciding what process or task should execute when a single process of the currently-scheduled parallel job is suspended or waiting. Clearly, therefore, the Cameron patent does not supply the missing teachings to obviate the invention as claimed. Neither Cameron nor Zolnowsky teaches or suggests means or steps for providing application information to a global scheduler; dynamically creating a global prioritized schedule of a plurality of tasks, the schedule including tasks of more than one application; communicating the global

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prioritized schedule to the at least one computing node; determining correspondence between the plurality of tasks and the plurality of local processes (which is not the same as Zolnowsky selecting a task from either the global or local queue); and dynamically prioritizing local processes in accordance with the global prioritized schedule to allow simultaneous execution of tasks from more than one application. Accordingly, Applicants respectfully maintain that the claims are patentable over the combination of Zolnowsky and Cameron.

Based on the foregoing amendments and remarks, Applicants respectfully request entry of the amendments, reconsideration of the amended claim language in light of the remarks, withdrawal of the rejections, and allowance of the claims.

Respectfully submitted,

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